

CLAIMS:

1. A living body information signal processing system combining a living body optical measurement apparatus and a brain wave measurement apparatus
5 comprising:

the living body optical measurement apparatus in which light of from visible to near infrared is irradiated from a first position on a head portion of a subject via an irradiation use optical fiber and the
10 penetration light is received at a second position on the head portion of the subject via a light receiving use optical fiber and which measures based on the received penetration light an optical characteristic variation induced by a brain activity inside the head
15 portion of the subject at a measurement position corresponding to an intermediate position between the first and second positions as a living body optical signal corresponding to the measurement position;

the brain wave measurement apparatus which
20 measures an electrical characteristic variation induced by a brain activity inside the head portion of the subject through a brain wave electrode attached to a third position representing a measurement position on the head portion of the subject as a brain wave signal
25 corresponding to the measurement position;

a probe device for the living body optical measurement apparatus and the brain wave measurement

apparatus which carries top end portions of the irradiation use optical fiber and the light receiving use optical fiber and the brain wave electrode and is to be mounted on the subject; and

5 a living body information signal processing and displaying device which displays the living body optical signal corresponding to respective measurement positions from the living body optical measurement apparatus and the brain wave signal corresponding to
10 respective measurement positions from the brain wave measurement apparatus on a common display device while correlating the respective measurement positions each other.

2. A system according to claim 1, wherein the
15 living body information signal processing and displaying device converts the respective signal intensities of the living body optical signal and the brain wave signal corresponding to the respective measurement positions into two dimensional living body
20 optical measurement image and brain wave measurement image expressed by shade of color and displays the same on the common display device individually or at the same time in a superposed manner or in a spatially spaced apart manner.

25 3. A system according to claim 2, wherein the living body information signal processing and displaying device displays at least one of the two

dimensional living body optical measurement image and brain wave measurement image respectively constituted from the living body optical signal and the brain wave signal corresponding to the respective measurement
5 positions on the common display device in an animating manner while switching the same in every unit time.

4. A system according to claim 1, wherein the living body information signal processing and displaying device displays in parallel diagrams
10 representing time course data respectively constituted from the living body optical signal and the brain wave signal measured at a same measurement position and at a same timing on the common display device.

5. A system according to claim 4, wherein the
15 living body information signal processing and displaying device displays the time course data at all of the measurement positions at the same time or while shifting time each other.

6. A system according to claim 1, wherein the
20 living body information signal processing and displaying device displays the measurement positions by the living body optical measurement apparatus and by the brain wave measurement apparatus in two dimensional manner or three dimensional manner on the
25 common display device together with an outline of a measurement portion of the subject.

7. A system according to claim 6, wherein the

living body information signal processing and displaying device includes a console, permits to select a measurement position of interest among measurement positions by the living body optical measurement apparatus and by the brain wave measurement apparatus via the console and displays diagrams representing time course data of the living body optical signal and the brain wave signal of the selected measurement position on the common display device.

10 8. A system according to claim 1, wherein the living body information signal processing and displaying device constitutes three dimensional images from the respective intensities of the living body optical signal and the brain wave signal corresponding to the respective measurement positions while correlating the respective two dimensional positions and displays the same on the common display device as well as constitutes a third three dimensional image by synthesizing both three dimensional images
15 mathematically and displays the same.
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 9. A system according to claim 1, wherein the living body information signal processing and displaying device displays diagrams representing time course data of the living body optical signal and the brain wave signal corresponding to the respective measurement positions on the common display device as well as constitutes a third diagram by synthesizing both
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diagrams representing time course data mathematically and displays the same.

10. A system according to claim 1, wherein the living body information signal processing and
5 displaying device adopts or rejects the living body optical signal measured by the living body optical measurement apparatus based on the brain wave signal measured by the brain wave measurement apparatus.

11. A system according to claim 10, wherein the
10 brain wave signal measured by the brain wave measurement apparatus is replaceable by a body motion signal measured by a body motion measurement device.

12. A system according to claim 1, wherein the living body information signal processing and
15 displaying device includes a cooperative control unit which performs a cooperative control for sampling of the measurement data from the living body optical measurement apparatus and from the brain wave measurement apparatus.

20 13. A system according to claim 1, further comprising a stimulation providing device which provides stimulation to the subject, and the stimulation providing device controls stimulation to be provided based on the brain wave signal measured by
25 the brain wave measurement apparatus.

14. A system according to claim 13, wherein the brain wave signal measured by the brain wave measurement

apparatus is replaceable by a body motion signal measured by a body motion measurement device.

15. A system according to claim 1, further comprising an open eye detection device which measures
5 an open degree of an eye of the subject, and the brain wave measurement apparatus calibrates the measured intensity of the brain wave signal depending on the open eye degree of the subject measured by the open eye detection device.

10 16. A system according to claim 1, wherein the top end portions of the irradiation use optical fiber and the light receiving use optical fiber and the brain wave electrode in the probe device for the living body optical measurement apparatus and the brain wave
15 measurement apparatus are carried by a common holder.

17. A system according to claim 16, wherein the top end portions of the irradiation use optical fiber and the light receiving use optical fiber and the brain wave electrode in the probe device for the living body
20 optical measurement apparatus and the brain wave measurement apparatus are respectively provided with a visible light reflecting member for indicating attachment positions thereof on the common holder.

18. A system according to claim 16, wherein the
25 brain wave electrode in the probe device for the living body optical measurement apparatus and the brain wave measurement apparatus is attached to the common holder

via an elastic member, the elastic member is compressed when the common holder is mounted on the subject and the brain wave electrode is pressed onto the subject.

19. A system according to claim 16, wherein the
5 brain wave electrode in the probe device for the living body optical measurement apparatus and the brain wave measurement apparatus is constituted by a sleeve member surrounding at least one of the top end portions of the irradiation use optical fiber and the light receiving
10 use optical fiber, a liquid holding member provided inside the sleeve member and conductive liquid held in the liquid holding member.

20. A system according to claim 16, wherein the
common holder in the probe device for the living body
15 optical measurement apparatus and the brain wave measurement apparatus is constituted by a net shaped member.

21. A system according to claim 20, wherein the
top end portions of the irradiation use optical fiber,
20 the light receiving use optical fiber and the brain wave electrode in the probe device for the living body optical measurement apparatus and the brain wave measurement apparatus are attached to the common holder constituted by the net shaped member via attachments
25 having a same configuration.

22. A system according to claim 16, wherein the
brain wave electrode in the probe device for the living

body optical measurement apparatus and the brain wave measurement apparatus is carried by a brain wave electrode holder, top end portions of the irradiation use optical fiber and the light receiving use optical fiber are carried by a gel like optical fiber use holder having an electrode coupling portion for coupling with the brain wave electrode, and the brain wave electrode use holder and the gel like optical fiber use holder are integrated by coupling the gel like optical fiber use holder through the brain wave electrode carried by the brain wave use holder via the electrode coupling portion from above the brain wave electrode use holder and are mounted on the subject.

23. A system according to claim 16, wherein the brain wave electrode in the probe device for the living body optical measurement apparatus and the brain wave measurement apparatus which is to be attached at the third position representing the measurement position on the head portion of the subject is carried by the common holder at an intermediate position between the irradiation use optical fiber and the light receiving use optical fiber disposed in adjacent manner on the common holder and attached respectively at the first position and the second position on the head portion of the subject.